PMT 90-S002J
Multiple Integrated Laser Engagement System (MILES) Communication Code (MCC) STANDARD

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PROGRAM EXECUTIVE OFFICE for SIMULATION, TRAINING, & INSTRUMENTATION
(PEO STRI)

(Supercedes previous version of the MILES Communication Code (MCC) PMT 90-S002I standard)

Revision Page

Changes from PMT 90-S002 Version "I" to PMT 03001J

	ECP	Change
1	Global	All applicable pages (Global Change): Date change and S002I to S002J was changed. Update TOC. Add Table of Figures. Add Table of Tables. Add Table of Appendices.
2	2004003	Change section 3.2.3.2 and Table D2 to allow interoperability with currently fielded MILE.
3	2004005	Change Table D1 and accompanying notes to allow flexibility to fixed delay values.
4	2004009	Remove updated P_k table from document.
5	2004010	Correct LEAR Formula in Appendix G.
6	2004011	Update PID numbers for MILES Code 35.
7	2004012	Change Table F1 to set range for MILES Code 35.
8	2004013	Change paragraphs 4.1 and 4.4 to set a standard of one or two Hit Words for Admin Functions.
9	2004014	Change sections 3.2.1.1-3 to alleviate wording confusion.
10	2004015	Change Appendix G for readability.
11	2004016	Add references to Appendix D tables D1, D2, and D3, in paragraphs 3.2.3.2 and 3.2.3.3.
12	2004017	Change references to Attachment 1 to Appendix G and correct appendix references in the document.

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APPENDICES

FIGURES

TABLES

1 SCOPE.

This Standard defines the Multiple Integrated Laser Engagement System (MILES) Communication Code (MCC) Structure for encoding/decoding weapon type, ammunition type, player identification, and weapon/ammunition lethality effects information transported through the MILES intra-system communication channels and interfaces and through interfaces with external systems. This MCC Standard also delineates other Live Training Tactical Engagement Simulation System (LTESS) structures as they apply to the Live Training environment for devices fielded through Program Manager Training Devices (PM TRADE).

2 REFERENCE DOCUMENTS.

None.

3 REQUIREMENTS.

LTESS Standard has the information content, format, and functions specified herein.

3.1. MCC Encoded Information Content.

MCC contains the following encoded information in its structure:

a. Weapon type: For example, 120mm Main Tank Gun, TOW Missile, M16 Rifle, etc.
b. Ammunition type: For example, 120mm Heat Round, TOW II Missile, 50 Cal Round, etc. (Refer to Appendix E)
c. Weapon/Ammunition effects at target as follows:
    1. Hit: Heavy weapon class targets with specific degree of lethality effect to be determined by target decoder system.
    2. Hit: Light weapon class targets with specific degree of the lethality effect to be determined by target decoder system.
    3. Near Miss for heavy weapon class.
    4. Near Miss for light weapon class.
d. Player Identification (PID)
    1. Unique identifier for each designated player: man, vehicle, weapon system, organizational unit etc.
    2. Friend or Foe designation.
e. Administrative Function Information:
    1. Bore Sight Code.
    2. Reset Command.
    3. Resurrect Command.
    4. Time Synchronization.
    5. Other Functions

3.2. MCC Format.

MCC format is a digital bit pattern arranged in a clocked time sequence. The time sequenced bit patterns are organized on basic word units that are assembled into successively larger and more information rich structures as follows:

a. The MCC Word, hereafter referred to as Word, is the basic bit pattern unit structure.
b. The Message is a sequence of groups of identical Words. In general, each group will contain an even number of a particular MCC Word. Each group will be separated from the following group by a time delay.
c. The Routine is a sequence of one or more Messages.

Each successive structure complexity level - Word, Message, Routine - adds additional information for transport to a MCC MILES receiver/decoder.

3.2.1 MCC Word Format.

The Word structure is detailed in the following paragraphs:

3.2.1.1 Word Time Base.

The Word time base clock rate is 48KHz +/-0.015%. The word time base is partitioned into 11 Time Slots labeled 0,1, 2, ... 10. The Time Slot duration is 333.3 µs +/- 0.015% based on the 3KHz sub-harmonic of the 48KHz time base clock. Each Time Slot is further subdivided into 16 time intervals; each referred to as a Bin. The Bins are numbered by convention 0, 1,…15. Each Bin has time duration of 20.83 µs +/- 0.015% based on the fundamental 48KHz-clock frequency. The Word has a total duration of 3.667 ms +/-0.015%. Refer to Figure 1(below).

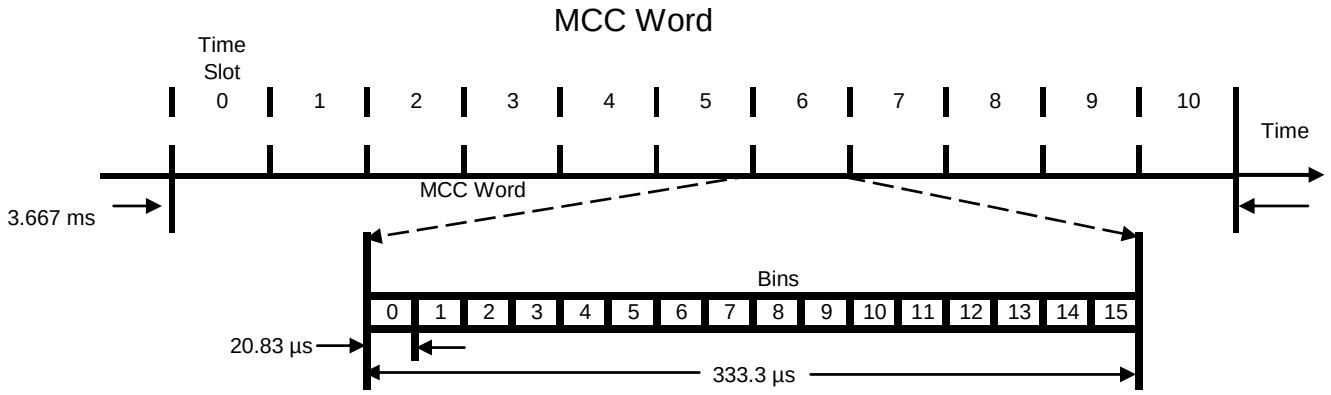

Figure 1: MCC Word Time Base Format

3.2.1.2 Word Digital Bit Format.

The Word is structured using a digital bit format. The bits are precisely positioned on the Word time base. A Logic State 1 represents a communication medium activation: for example a laser light pulse. A Logic State 0 represents the absence of a communication medium activation. Each Logic State 1 is precisely positioned in a specific Bin in a specific Time Slot.

3.2.1.2.1 Word Bit Weight.

Every MCC Word contains exactly 10 Logic State 1s for a total Word Bit Weight of 10, except the basic MILES Code subset without Player ID. The basic MILES code word is composed of 11 bits with a weight of 6 bits always being Logic State 1 and the remaining 5 bits being Logic State 0. Refer to Appendix A and E.

3.2.1.2.2 Bit Positioning.

Logic State 1 is positioned only in Bin 0, 6, 8, or 10 of a Time Slot and:

a. A Word will NEVER have a valid Logic State 1 positioned in Bin 1, 2, 3, 4, 5, 7, 9, 11, 12, 13, 14 or 15.

b. There will NEVER be more than two Logic State 1s in any Time Slot.

c. A valid Word will ALWAYS have a Logic State 1 in the Bin 0 of its first two Time Slots (Time Slot 0 and Time Slot 1).

d. A Word will generally have a Logic State 0 in Bin 0 of the third Time Slot (Time Slot 2), except for code E1 (special codes) that has a Logic State 1 in Bin 0 of the third Time Slot (Time Slot 2).

e. Refer to Appendix A and E.

3.2.1.3 MCC Word Code Designator.

The MCC Word Code Designator uniquely specifies the exact MCC Word bit pattern positioned in its time base. It has the format **X.YZ.SPID** where:

a. **X** is a decimal number from 00 to 36, each of which identifies a specific Basic MILES Code bit pattern as listed in Appendix A. Each Logic State 1 in Appendix A is always positioned in Bin 0 of any Time Slot of a MCC Word in which it occurs. X is the only part of the MCC Word that is decoded by a Basic MILES set.

b. **SPID** (Standard Player Identification) is a decimal number from 001 to 330, each of which identifies a specific bit pattern as listed in Appendix B. These bit patterns are used to encode desired Player Identification (PID), Ammunition Type, and BLUEFOR or OPFOR designation into the MCC Word. The SPID is encoded by inserting a Logic State 1 into four of the eleven Time Slots in the MCC Word. Since Bin 0 of a Time Slot is reserved for the X portion of the MCC Word, only Bins 6, 8, and 10 are used for the SPID. Refer to Paragraph 3.2.1.5.1 for the method to translate any desired Player ID number, ranging from 0001 to 3300, for any specified allowed ammo type into the MCC YZ.SPID portion of the Word Designator.

c. **Y** is a hexadecimal number from 0 to F, representing a binary bit pattern 0000 to 1111. This number, along with **Z**, is used to allow more information to be "carried" with the **SPID**. Each 0 in the bit pattern represented by the hexadecimal number indicates that the logic 1 of the **SPID** is in Bin 8 of the Time Slot. Each 1 in the bit pattern indicates the logic 1 is in Bin 6 of the Time Slot. Since there are only four (4) logic 1s in a **SPID**, each bit in **Y** represents one of those logic 1s. The most significant bit of **Y** applies to the 1st logic 1 in the **SPID** bit pattern reading from left to right. The 2nd most significant bit of **Y** applies to the 2nd logic 1 of the **SPID**, etc. For example, assume the PID of 59 (10010011000) is to be encoded. If **Y** were given the value of D (1101), this would indicate that Time Slots 0, 3, and 7 would have a logic 1 in Bin 6, and that Time Slot 6 would have a logic 1 in Bin 8.

d. **Z** is also a hexadecimal number from 0 to F that represents a bit pattern from 0000 to 1111. **Z** is used to modify the "instruction" given by **Y**. Every logic 1 in **Z** indicates that instead of Bin 8, Bin 10 of a Time Slot is used and the corresponding Y logic state position is 0. A logic 0 indicates that the Bin specified in **Y** is to be used. Just like **Y**, each bit in **Z** represents one of the four logic 1s of the **SPID**, where the most significant bit of **Z** corresponds to the most significant bit of the **SPID**; the 2nd most significant bit of **Z** corresponds to the 2nd bit of the **SPID**, etc. Consider the following example as to how **Z** can modify the instruction given by **Y**:

> Given a PID of 59 (10010011000)
> **Y** is D (1101)
> **Z** is 2 (0010)
>
> The **SPID** indicates there will be a Logic State 1 in Time Slots 0, 3, 6, and 7. **Y** indicates that Time Slots 0, 3, and 7 would have a Logic State 1 in Bin 6, and Time Slot 6 would have a Logic State 1 in Bin 8. Given that **Z** is 2 (0010), Time Slot 6 would now have a Logic State 1 in Bin 10 instead of in Bin 8. Time Slots 0, 3, and 7, would remain unchanged and still use Bin 6.

A complete list of the valid MCC PID/Ammo type partition is contained in Appendix C, Table C1, for each X entry in Appendix A. Appendix C, Table C2 specifies Bin positions corresponding to the YZ portion of the Word Designator.

3.2.1.3.1 Example MCC Word Designator Translation to Its Bit Pattern

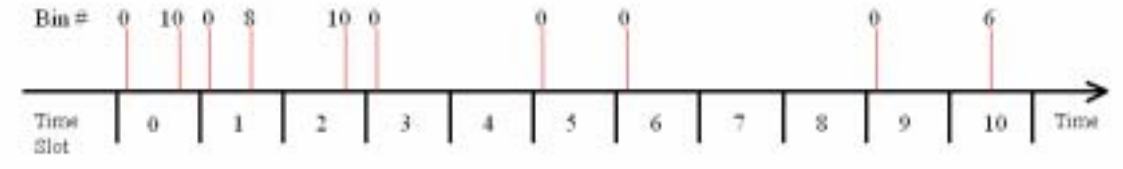

Figure 2: Word 12.1A.211 Bit Pattern

For example, the bit pattern for Word, 12.1A.211, illustrated in Figure 2, translates as follows:

a. The first two digits, 12, is **X**, the Basic Miles Code bit pattern. Appendix A indicates the bit pattern for 12 to be 11010110010. Each Logic State 1 is positioned in Bin 0 of the Time Slot corresponding to its column position in Appendix A. A Logic State 1 positioned in Bin 0 of Word Time Slot 0, etc. Figure 3 illustrates **X** of the MCC Word.

Figure 3: X of MCC Word

b. The last three digits, 211, represent the **SPID**. The bit pattern found in Appendix B for entry 211 is 11100000001. Each Logic State 1 of the **SPID** is positioned in the Time Slot (labeled 0, 1, ... 10) corresponding to the column that the bit occurs (labeled D0, D1, ...D10). Each bit is precisely positioned in either Bin 6, Bin 8, or Bin 10 of its Time Slot according to the instruction contained in the **Y** and **Z** hexadecimal code digits of the Word Designator. In this example, the bit pattern specified by 211 has a Logic State 1 in Time Slots 0 (D0), 1(D1), 2(D2), and 10 (D10).

c. The **Y** hexadecimal digit, 1, converted to binary in the order most significant bit to least is 0001. A 1 signifies that its corresponding Logic State 1 is positioned in Bin 6 of a Time Slot. A 0 signifies Bin 8. In this example, the bit in Time Slot 0 is positioned in Bin 8, the bit in Time Slot 1 is in Bin 8, the bit in Time Slot 2 is in Bin 8, and the bit in Time Slot 10 is in Bin 6. Figure 4 illustrates the **SPID** bit pattern in the Bins as indicated by **Y**.

Figure 4: SPID Bit Pattern in Bins Designated by Y

d. The **Z** hexadecimal digit, A, converted to binary is 1010. A 1 signifies the corresponding bit is positioned in a Bin 10 of its Time Slot superceding the instruction of the Y hexadecimal digit. A 0 signifies the corresponding bit remains in the Bin in which it was positioned by Y. In this example, the bit in Time Slot 0 shifts to Bin 10 and the bit in Time Slot 1 remains in Bin 8, the bit

in Time Slot 2 shifts to Bin 10, and bit Time Slot 10 remains in Bin 6. The **SPID** bit pattern in the Bins designated by Z is shown in Figure 5. The result is the bit pattern for Word, 12.1A.211, properly structured on its time base shown in Figure 2.

Figure 5: SPID Bit Pattern in Bins Designated by Y and Z

Refer to Appendix C, Table 2 for a list of all valid YZ.SPID Designator SPID bit pattern Bin locations.

3.2.1.4 Information Contained in the X Designator (Basic MILES Code) Bit Patterns, Appendix A.

Information contained in the bit patterns designated by X of the MCC Word Designator X.YZ.SPID falls into one of the following six categories:

a. **Heavy Weapon Hit**: Informs a target receiver/decoder that the target has been Hit by a heavy weapon/ammunition such as a TOW Missile, 120mm Cannon round, etc. The X designations 01 through 26, 32, 33 or 34 in Appendix A form this category.
b. **Heavy Weapon Near Miss:** Informs a target receiver/decoder that the target has been engaged by a heavy weapon/ammunition and not Hit, but rather Near Missed. The X designations 28 and 31 in Appendix A form this category.
c. **Light Weapon Hit**: Informs a target receiver/decoder that the target has been Hit by a light weapon/ammunition such as a M16 Rifle Round, etc. The X designator 27 in Appendix A forms this category.
d. **Light Weapon Near Miss**: Informs a target receiver/decoder that the target has been engaged by a light weapon/ammunition and not hit, but rather Near Missed. The X designator 29 forms this category.
e. **Universal Kill**: Informs any target receiver/decoder in the MCC system that it has been killed. This is a 100% administrative kill effect. The X designator 00 forms this category.
f. **Administrative Functions Codes**: Inform target receiver/decoder of special function information such as Bore Sighting Activity, Reset, Resurrect, Time Synchronization, or other administrative functions. The X designators 30, 35, and 36 form this category.

3.2.1.5 Information Contained in the YZ.SPID Designator.

The information contained in the YZ.SPID portion of the MCC Word Designator includes:

a. Standard Player ID number. Refer to Appendix B.
b. Even Player IDs are BLUEFOR; odd are OPFOR by convention. Refer to Appendix C, Table C1.
c. Ammunition (Ammo) type. Appendix C provides an expansion of Weapon/Ammo types based on those types listed in Appendix A.

3.2.1.5.1 Translation of Desired Player ID and Ammo Type to MCC Word Designator Format.

The following steps translate any valid MCC Player ID number, ranging from 1 to 3300, to the YZ.SPID portion of the MCC Word Designator format. Refer to Appendix C, Table C1. Using Table C1, proceed as follows:

Step 1: Select BLUEFOR or OPFOR category.

Step 2: Select the desired ammo type consistent with the selection made in Step 1.

Step 3: Select the desired Player ID numbers, 1 through 3300 consistent with selection made in Step 2.

Step 4: Determine the Serial Number consistent with the selections made in the above Steps from Appendix C, Table C1, Column 1, and the corresponding code prefix hexadecimal number resulting in "YZ" from Appendix C, Table C1, Column 2.

Step 5: Multiply the Serial Number by the number, 330.

Step 6: Subtract the resulting number from the selected Player ID number. This is the Word Designator SPID number.

Step 7: The MCC YZ.SPID portion of the Word Designator is the combination of the hexadecimal number determined in Step 3 and the resultant SPID number from Step 6.

Some examples are:

MCC Player ID	Ammo Type	YZ.SPID
2900	Ammo D	1C.260
0001	Ammo H	C0.001
1201	Ammo F	70.211

3.2.2 Message Format.

The Message is structured in time sequence in the most general case with format as follows:

a. A group of Words containing a number, K, of identical Heavy Weapon Hit Words, where K=0, or multiples of 2.
b. Followed by a time delay, D1, to prevent code jamming in the decoder system.
c. Followed by a group Words containing a number, M, of identical Light Weapon Hit Words, where M=0, or multiples of 2.
d. Followed by a time delay, D2, to prevent code jamming in the decoder system.
e. Followed by a group of identical Heavy Weapon Near Miss Words, Nh followed by a time delay D3 and/or a group Light Weapon Near Miss Words, Nl where, Nh and/or Nl each or both are 0 or multiples of 2.

The values for each of the Message parameters: K, M, Nh, Nl, D, D1, D2, D3 for a particular application are specified in Appendix D for encoding and/or decoding processing.

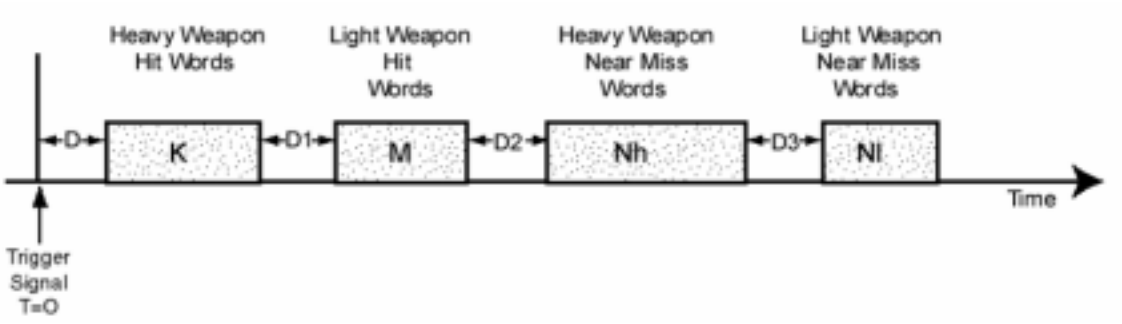

Figure 6: Message Format

3.2.2.1 Direct Fire Weapon Message.

The direct Fire Weapon Message communicates specified information for weapons/ammunitions that are aimed and released at a target with no other further guidance beyond the original release conditions. These are communicated in a message routine format described in paragraph 3.2.3.1. The Direct Fire Weapon Message format is D K D1 M D2 Nh D3 and/or Nl. Refer to Figure 6 (above).

Refer to Appendix G for Direct Fire Message adaptation for high rate of fire weapons.

3.2.2.2 Guided Missile Weapon Message.

The Guided Missile Weapon Message communicates specified information for weapons/ammunitions that are aimed, released and guided by the operator until the weapon/ammunition makes contact with the target or reaches its maximum time of flight. The Guided Missile Weapon Message format is: K where K contains a specified even number of Words. These are transmitted in a Message Routine format described in Paragraph 3.2.3.2.

3.2.2.3 Fire and Forget Missile Weapon Message.

The Fire and Forget Missile Weapon Message communicates specified information for weapons that are aimed, and released by the operator but then seek a target in the designated target window guided by internal smart or seeker systems. The Fire and Forget Weapon Message format is D K D1 M D2 Nh D3 N1 where K contains a specified even number of Words. These are communicated in a Message Routine format described in Paragraph 3.2.3.3.

3.2.2.4 Administrative Function Messages.

An Administrative Function Message communicates special information and/or administrative command such as a Time Synchronization, Reset, Resurrect, Universal Kill, Bore Sight etc. Each Administrative Function Message has a unique format. In general, each type Administrative Function Message is transmitted in a Message Routine format described in Paragraph 3.2.3.4.

3.2.3 MCC Message Routine Format.

MCC Message Routine format is a series of Messages in a time sequence string. Message Routine types are as follows:

3.2.3.1 Direct Fire Routine (DFR).

The Direct Fire Routines are as follows:

a. Heavy Weapons Routine Format: The format is: D K D1 M D2 Nh D3 Nl. Refer to Figure 6.
b. Light Weapons Routine: The format is: D M D2 Nl.

Refer to Appendix D, Table D1 for encoding and decoding parameter specifications.

3.2.3.2 Guided Missile Routine (GMR).

The Guided Missile Routine starts with a trigger signal followed by an initial time delay D. Next follows the Initial Guidance Sequence (IGS) containing a number, Ig, of Guided Missile Messages (GMM) with a time delay, DA, between each GMM. Then follows the Final Guidance Sequence (FGS) containing a number, Fg, of GMMs spaced with a time delay, DB, between each. Finally, a Light Weapon Hit Message, M, positioned after a time delay of D1 at the end of the sequence completes the GMR. The GMM shall consists of eight (8) Heavy Weapon Hit Words.

In general, the GMR format is: Trigger Signal - D - GMM DA GMM DA (repeated Ig times) - GMM DB GMM DB GMM DB (repeated Fg times) D1 M where GMM is a particular MCC Guided Missile Message and M is a Light Weapon Hit Message. D is an initial time delay; DA and DB are time delays that will be inserted to simulate missile time of flight and missile guidance tracking characteristics.

The two separate GMM sequences, IGS, and FGS, are formulated to accommodate the time of flight and the guidance characteristics of a particular guided missile weapon. Usually, the missile guidance is more critical near the end of the time of flight so that DA is larger than DB and the number, Ig, of GMMs in the IGS may be equal to or less than the number, Fg, of GMMs in the FGS. The MCC decoder must successfully decode a specified number, Gk, of GMMs from the combined IGS and FGS of the total Guided Missile Routine. Refer to Figure 7 (below) for Guided Missile Routine format and to Appendix D, Table D2 for GMR parameter values for a particular Guided Missile Weapon in the MILES system. The design shall include a selectable alternate routine that has the same parameters for a 2600 m range (Basic MILES 10 sec time of flight) for IGS and FGS regardless of the actual range. See Appendix D, Table D2.

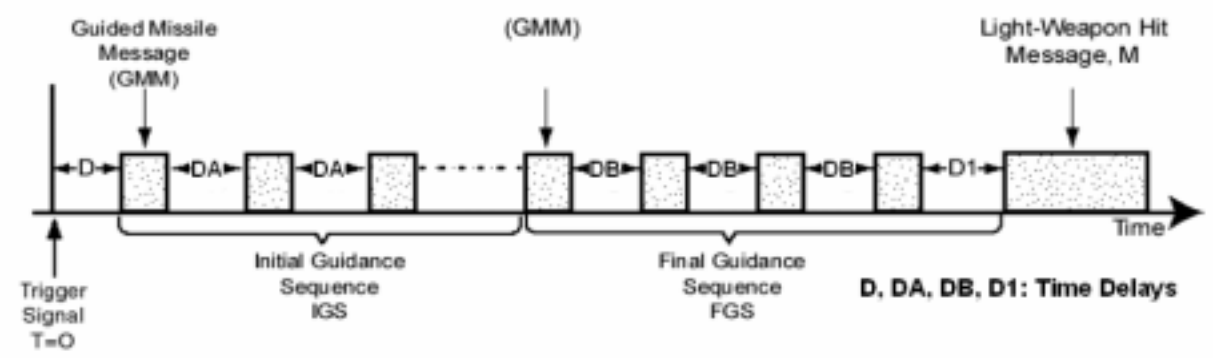

Figure 7: Missile Routine (GMR) Format

3.2.3.3 Fire and Forget Routine (FFR):

The Fire and Forget Routine is sequence of at least two MCC Code 09 Heavy Weapon Hit Words with the possibility of having the maximum even number of K Words with or without any time delays between. This is followed by a group of M Light Weapon Hit Words, where M =0 or multiples of 2, with or without a time delay D1.

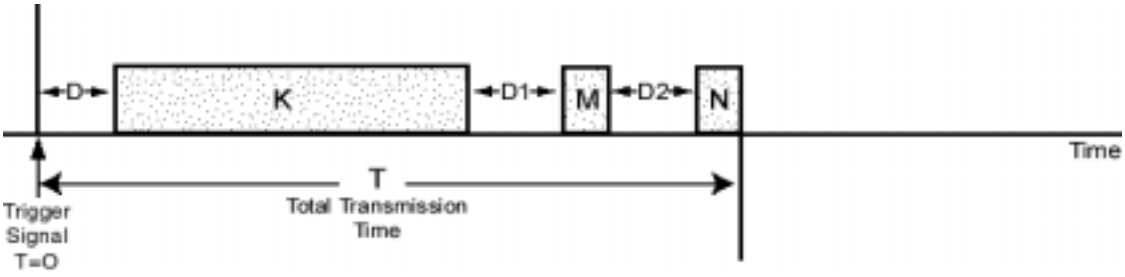

Figure 8: Fire and Forget Routine (FFR) Format

This is followed by a group of N near miss words, where N =0 or multiples of 2, with or without a time delay D2. The transmission time will not exceed a total of T seconds per trigger pull. Refer to Figure 8 (above) for Fire and Forget Routine format and to Appendix D, Table D3 for encoding and decoding parameter values for K, D1, M, D2, N and T.

3.2.3.4 Administrative Function Routine (AFR):

The Administrative Function Routine is unique for each administrative function. An Administrative Function Routine for functions other than “Boresight” may have a trigger signal and a time delay as indicated. The time delay may be greater than or equal to 0. Next follows a group of K1 Administrative Function Words, where K1 is a multiple of 2.

Refer to Figure 9 and Appendix F for AFR encoding and decoding parameter values for K1.

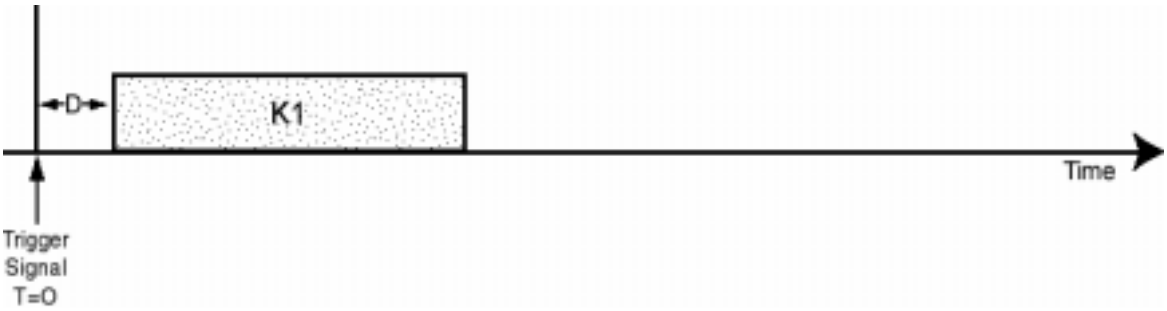

Figure 9: Administrative Function Routine (AFR) Format

An administrative Function Routine for "Boresight" function is a continuous transmission data bit pattern shown in Appendix A.

4 MCC Routine Decoding Scheme.

The MCC Routine Decoding Scheme requires MCC Word reception and decoding as follows:

4.1. Direct Fire Weapon Routine (DFR) Decoding.

The DFR decoding scheme requires the reception for decoding the number of Words per Direct Fire Weapon Message as follows.

Vehicle Target Systems: Two (2) Hit Words or two (2) Near Miss Words within an eight (8) Word time period for all MILES codes as listed in Appendix A.

Man Worn & Standalone MILES TOW Systems: Either One (1) Hit word or One (1) Near Miss Word within an eight (8) Word time period for MILES Codes 00,24,27, and 29 as listed in Appendix A. Or either Two (2) Hit Words or two (2) Near Miss Word within an eight (8) Word time period for all other MILES codes as listed in Appendix A.

Refer to Appendix G for Lethality Effects Assessment Routine.

4.2. Guided Missile Routine (GMR) Decoding.

The GMR decoding scheme is triggered by the reception and decoding of the first Guided Missile Word in a GMM. Refer to Figure 7. This event initiates a tracking interval time window for decoding the instant GMR which is T seconds long as specified as a design parameter for a specified guided missile weapon in Appendix D. The GMR has Ig +Fg total GMMs available for decoding during tracking interval T. The GMR decoding scheme permits only one Word decoding per GMM. As soon as a Word is successfully decoded in a GMM, an inhibit for a time period equivalent to one GMM (TGMM) is imposed to prevent any further Word decoding during that period. Refer to Figure 10 (below).

An accumulation of a total of Gk GMMS during the tracking time T is required to trigger a Hit evaluation response. An accumulation of 2 through Gk-1 decoded GMMs will result in a Near Miss evaluation response. Refer to Appendix G for Lethality Effects Assessment Routine.

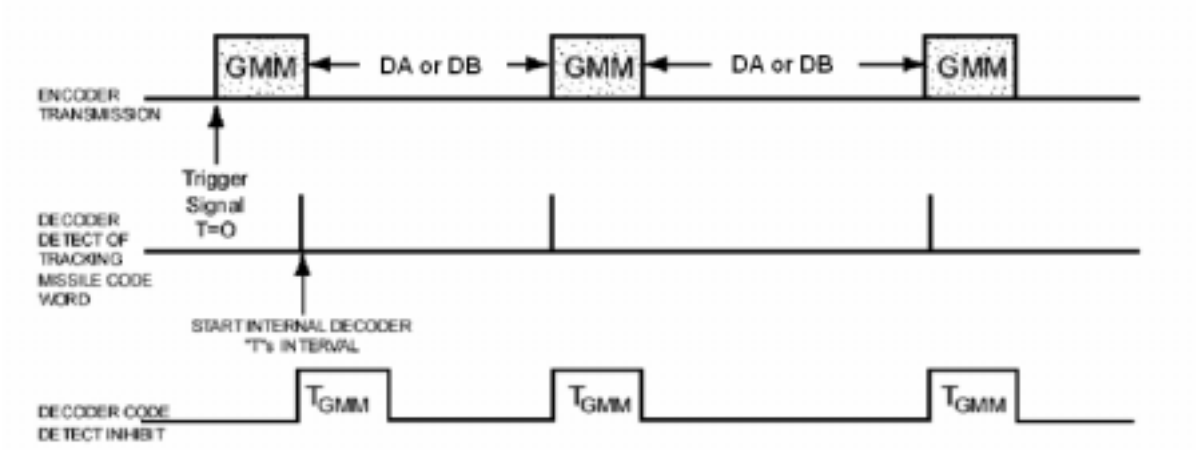

Figure 10: Decoder Timing - Guided Missile Routine

4.3. Fire and Forget Missile Routine (FFR) Decoding.

The FFR missile-decoding scheme is triggered by the reception and decoding of the first Fire and Forget Weapon Word. This event initiates a decoding window of two second. The successful decoding of N Fire and Forget Words accumulated in the decoding window will result in a hit evaluation response. The accumulation of fewer than N decoded Words during period of two seconds or the reception of a near miss Word in the absence of a decoded hit Word during the two second window will result in a near miss evaluation. The design parameters N for a specified Fire and Forget Weapon are listed in Appendix D.

Refer to Appendix G for Lethal Effects Assessment Routine.

4.4. Administrative Function Routine (AFR) Decoding.

The AFR decoding scheme for functions other than "Boresight" requires the decoding of one (1) word for Man Worn and Standalone MILES TOW Systems and two (2) Administrative Hit Words for all other systems within an eight (8) Word time period.

5 Lethality Effects Assessment Routine and Tables.

Refer to Appendix G.

6 Probability of Kill (P_k) Charts.

Contact PEO STRI LT group or refer to MILES website http://www.peostri.army.mil/PRODUCTS/MCC97/ for POC.

7 Ammo Type Partitioning Assignment Table.

Refer to Appendix E.

APPENDIX A: BASIC MILES CODE STRUCTURE

TABLE A1: BASIC MILES CODE STRUCTURE

TIME SLOTS			BASIC MILES CODE(x) NO.	WEAPON/FUNCTION
0 1 2	**3 4 5 6**	**7 8 9 10**		
1 1 0	0 0 1 0	1 1 0 1	00	UNIV. KILL
1 1 0	1 0 0 1	0 0 1 1	01	HELLFIRE
1 1 0	0 0 1 1	0 1 0 1	02	UNASSIGNED
1 1 0	0 0 1 0	1 0 1 1	03	AT-3
1 1 0	0 1 0 1	0 0 1 1	04	UNASSIGNED
1 1 0	1 0 1 0	1 0 0 1	05	UNASSIGNED
1 1 0	0 1 1 0	0 1 0 1	06	UNASSIGNED
1 1 0	1 1 0 1	1 0 0 0	07	TOW, AT-5 (KONKURZ)
1 1 0	1 0 1 1	0 1 0 0	08	DRAGON
1 1 0	1 1 0 0	1 0 0 1	09	FIRE & FORGET MISSILES
1 1 0	0 1 1 0	1 0 0 1	10	125MM
1 1 0	0 1 0 0	1 0 1 1	11	CLAYMORE MINE
1 1 0	1 0 1 1	0 0 1 0	12	105MM HIT
1 1 0	1 1 0 0	1 0 1 0	13	122MM ARTY DF
1 1 0	0 1 0 1	1 0 0 1	14	73MM, 2.75” ROCKET, 57MM
1 1 0	1 0 1 0	1 1 0 0	15	VIPER, RPG-7, CARL GUSTAV, AT-4
1 1 0	0 1 0 1	0 1 0 1	16	120MM
1 1 0	1 0 0 1	0 1 0 1	17	90MM
1 1 0	0 1 1 0	0 0 1 1	18	152MM, 155MM
1 1 0	1 0 1 1	0 0 0 1	19	40MM GRENADE
1 1 0	1 1 0 0	0 1 0 1	20	ROCKEYE, SMAW
1 1 0	1 1 0 1	0 1 0 0	21	30MM, GAU-8
1 1 0	0 0 1 1	0 0 1 1	22	25MM, ZSU-23/4
1 1 0	1 0 0 0	1 0 1 1	23	30MM (NTC HIND-D), VULCAN
1 1 0	0 0 0 1	0 1 1 1	24	HEAVY MG (M2, M85)
1 1 0	1 0 0 0	1 1 0 1	25	CHAPARRAL, SAM
1 1 0	0 1 0 0	1 1 0 1	26	STINGER
1 1 0	0 1 0 0	0 1 1 1	27	SMALL ARMS (M16, M60 MG, COAX)
1 1 0	1 1 1 0	0 0 0 1	28	HEAVY WEAPON MISS
1 1 0	0 0 1 0	0 1 1 1	29	LIGHT WEAPON MISS
1 1 0	1 0 0 0	0 1 1 1	30	RESET FOR AIRCRAFT SYSTEMS, RESURRECT FOR GROUND SYSTEMS
1 1 0	1 0 1 0	0 0 1 1	31	HEAVY SPARE MISS
1 1 0	1 0 0 1	1 0 0 1	32	RF SAM
1 1 0	1 0 1 0	0 1 0 1	33	SA-14
1 1 0	1 1 0 0	0 0 1 1	34	AAA-2 30MM
1 1 0	0 0 0 1	1 0 1 1	35	CONTROLLER GUN UTILITY CODES
1 1 0	1 1 0 1	0 0 0 1	36	RESET FOR GROUND SYSTEMS, RESURRECT FOR AIRCRAFT SYSTEMS
1 0 0	0 0 1 0	0 0 0 1		BORESIGHT (Continuous Transmission)

*NOT USED IN STANDARD MILES EQUIPMENT MILES BORESIGHT CODE STRUCTURE

APPENDIX B

APPENDIX B: STANDARD MILES PLAYER ID (SPID) CODE ASSIGNMENTS

TABLE B1: STANDARD MILES PLAYER ID (SPID) CODE ASSIGNMENTS

PLAYER ID	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
1	1	1	1	1	0	0	0	0	0	0	0
2	1	1	1	0	1	0	0	0	0	0	0
3	1	1	0	1	1	0	0	0	0	0	0
4	1	0	1	1	1	0	0	0	0	0	0
5	0	1	1	1	1	0	0	0	0	0	0
6	1	1	1	0	0	1	0	0	0	0	0
7	1	1	0	1	0	1	0	0	0	0	0
8	1	0	1	1	0	1	0	0	0	0	0
9	0	1	1	1	0	1	0	0	0	0	0
10	1	1	0	0	1	1	0	0	0	0	0
11	1	0	1	0	1	1	0	0	0	0	0
12	0	1	1	0	1	1	0	0	0	0	0
13	1	0	0	1	1	1	0	0	0	0	0
14	0	1	0	1	1	1	0	0	0	0	0
15	0	0	1	1	1	1	0	0	0	0	0
16	1	1	1	0	0	0	1	0	0	0	0
17	1	1	0	1	0	0	1	0	0	0	0
18	1	0	1	1	0	0	1	0	0	0	0
19	0	1	1	1	0	0	1	0	0	0	0
20	1	1	0	0	1	0	1	0	0	0	0
21	1	0	1	0	1	0	1	0	0	0	0
22	0	1	1	0	1	0	1	0	0	0	0
23	1	0	0	1	1	0	1	0	0	0	0
24	0	1	0	1	1	0	1	0	0	0	0
25	0	0	1	1	1	0	1	0	0	0	0
26	1	1	0	0	0	1	1	0	0	0	0
27	1	0	1	0	0	1	1	0	0	0	0
28	0	1	1	0	0	1	1	0	0	0	0
29	1	0	0	1	0	1	1	0	0	0	0
30	0	1	0	1	0	1	1	0	0	0	0
31	0	0	1	1	0	1	1	0	0	0	0
32	1	0	0	0	1	1	1	0	0	0	0
33	0	1	0	0	1	1	1	0	0	0	0
34	0	0	1	0	1	1	1	0	0	0	0
35	0	0	0	1	1	1	1	0	0	0	0
36	1	1	1	0	0	0	0	1	0	0	0
37	1	1	0	1	0	0	0	1	0	0	0
38	1	0	1	1	0	0	0	1	0	0	0
39	0	1	1	1	0	0	0	1	0	0	0
40	1	1	0	0	1	0	0	1	0	0	0
41	1	0	1	0	1	0	0	1	0	0	0
42	0	1	1	0	1	0	0	1	0	0	0
43	1	0	0	1	1	0	0	1	0	0	0
44	0	1	0	1	1	0	0	1	0	0	0
45	0	0	1	1	1	0	0	1	0	0	0
46	1	1	0	0	0	1	0	1	0	0	0
47	1	0	1	0	0	1	0	1	0	0	0

APPENDIX B

PLAYER ID	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
48	0	1	1	0	0	1	0	1	0	0	0
49	1	0	0	1	0	1	0	1	0	0	0
50	0	1	0	1	0	1	0	1	0	0	0
51	0	0	1	1	0	1	0	1	0	0	0
52	1	0	0	0	1	1	0	1	0	0	0
53	0	1	0	0	1	1	0	1	0	0	0
54	0	0	1	0	1	1	0	1	0	0	0
55	0	0	0	1	1	1	0	1	0	0	0
56	1	1	0	0	0	0	1	1	0	0	0
57	1	0	1	0	0	0	1	1	0	0	0
58	0	1	1	0	0	0	1	1	0	0	0
59	1	0	0	1	0	0	1	1	0	0	0
60	0	1	0	1	0	0	1	1	0	0	0
61	0	0	1	1	0	0	1	1	0	0	0
62	1	0	0	0	1	0	1	1	0	0	0
63	0	1	0	0	1	0	1	1	0	0	0
64	0	0	1	0	1	0	1	1	0	0	0
65	0	0	0	1	1	0	1	1	0	0	0
66	1	0	0	0	0	1	1	1	0	0	0
67	0	1	0	0	0	1	1	1	0	0	0
68	0	0	1	0	0	1	1	1	0	0	0
69	0	0	0	1	0	1	1	1	0	0	0
70	0	0	0	0	1	1	1	1	0	0	0
71	1	1	1	0	0	0	0	0	1	0	0
72	1	1	0	1	0	0	0	0	1	0	0
73	1	0	1	1	0	0	0	0	1	0	0
74	0	1	1	1	0	0	0	0	1	0	0
75	1	1	0	0	1	0	0	0	1	0	0
76	1	0	1	0	1	0	0	0	1	0	0
77	0	1	1	0	1	0	0	0	1	0	0
78	1	0	0	1	1	0	0	0	1	0	0
79	0	1	0	1	1	0	0	0	1	0	0
80	0	0	1	1	1	0	0	0	1	0	0
81	1	1	0	0	0	1	0	0	1	0	0
82	1	0	1	0	0	1	0	0	1	0	0
83	0	1	1	0	0	1	0	0	1	0	0
84	1	0	0	1	0	1	0	0	1	0	0
85	0	1	0	1	0	1	0	0	1	0	0
86	0	0	1	1	0	1	0	0	1	0	0
87	1	0	0	0	1	1	0	0	1	0	0
88	0	1	0	0	1	1	0	0	1	0	0
89	0	0	1	0	1	1	0	0	1	0	0
90	0	0	0	1	1	1	0	0	1	0	0
91	1	1	0	0	0	0	1	0	1	0	0
92	1	0	1	0	0	0	1	0	1	0	0
93	0	1	1	0	0	0	1	0	1	0	0
94	1	0	0	1	0	0	1	0	1	0	0
95	0	1	0	1	0	0	1	0	1	0	0
96	0	0	1	1	0	0	1	0	1	0	0
97	1	0	0	0	1	0	1	0	1	0	0

APPENDIX B

PLAYER ID	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
98	0	1	0	0	1	0	1	0	1	0	0
99	0	0	1	0	1	0	1	0	1	0	0
100	0	0	0	1	1	0	1	0	1	0	0
101	1	0	0	0	0	1	1	0	1	0	0
102	0	1	0	0	0	1	1	0	1	0	0
103	0	0	1	0	0	1	1	0	1	0	0
104	0	0	0	1	0	1	1	0	1	0	0
105	0	0	0	0	1	1	1	0	1	0	0
106	1	1	0	0	0	0	0	1	1	0	0
107	1	0	1	0	0	0	0	1	1	0	0
108	0	1	1	0	0	0	0	1	1	0	0
109	1	0	0	1	0	0	0	1	1	0	0
110	0	1	0	1	0	0	0	1	1	0	0
111	0	0	1	1	0	0	0	1	1	0	0
112	1	0	0	0	1	0	0	1	1	0	0
113	0	1	0	0	1	0	0	1	1	0	0
114	0	0	1	0	1	0	0	1	1	0	0
115	0	0	0	1	1	0	0	1	1	0	0
116	1	0	0	0	0	1	0	1	1	0	0
117	0	1	0	0	0	1	0	1	1	0	0
118	0	0	1	0	0	1	0	1	1	0	0
119	0	0	0	1	0	1	0	1	1	0	0
120	0	0	0	0	1	1	0	1	1	0	0
121	1	0	0	0	0	0	1	1	1	0	0
122	0	1	0	0	0	0	1	1	1	0	0
123	0	0	1	0	0	0	1	1	1	0	0
124	0	0	0	1	0	0	1	1	1	0	0
125	0	0	0	0	1	0	1	1	1	0	0
126	0	0	0	0	0	1	1	1	1	0	0
127	1	1	1	0	0	0	0	0	0	1	0
128	1	1	0	1	0	0	0	0	0	1	0
129	1	0	1	1	0	0	0	0	0	1	0
130	0	1	1	1	0	0	0	0	0	1	0
131	1	1	0	0	1	0	0	0	0	1	0
132	1	0	1	0	1	0	0	0	0	1	0
133	0	1	1	0	1	0	0	0	0	1	0
134	1	0	0	1	1	0	0	0	0	1	0
135	0	1	0	1	1	0	0	0	0	1	0
136	0	0	1	1	1	0	0	0	0	1	0
137	1	1	0	0	0	1	0	0	0	1	0
138	1	0	1	0	0	1	0	0	0	1	0
139	0	1	1	0	0	1	0	0	0	1	0
140	1	0	0	1	0	1	0	0	0	1	0
141	0	1	0	1	0	1	0	0	0	1	0
142	0	0	1	1	0	1	0	0	0	1	0
143	1	0	0	0	1	1	0	0	0	1	0
144	0	1	0	0	1	1	0	0	0	1	0
145	0	0	1	0	1	1	0	0	0	1	0
146	0	0	0	1	1	1	0	0	0	1	0
147	1	1	0	0	0	0	1	0	0	1	0

APPENDIX B

PLAYER ID	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
148	1	0	1	0	0	0	1	0	0	1	0
149	0	1	1	0	0	0	1	0	0	1	0
150	1	0	0	1	0	0	1	0	0	1	0
151	0	1	0	1	0	0	1	0	0	1	0
152	0	0	1	1	0	0	1	0	0	1	0
153	1	0	0	0	1	0	1	0	0	1	0
154	0	1	0	0	1	0	1	0	0	1	0
155	0	0	1	0	1	0	1	0	0	1	0
156	0	0	0	1	1	0	1	0	0	1	0
157	1	0	0	0	0	1	1	0	0	1	0
158	0	1	0	0	0	1	1	0	0	1	0
159	0	0	1	0	0	1	1	0	0	1	0
160	0	0	0	1	0	1	1	0	0	1	0
161	0	0	0	0	1	1	1	0	0	1	0
162	1	1	0	0	0	0	0	1	0	1	0
163	1	0	1	0	0	0	0	1	0	1	0
164	0	1	1	0	0	0	0	1	0	1	0
165	1	0	0	1	0	0	0	1	0	1	0
166	0	1	0	1	0	0	0	1	0	1	0
167	0	0	1	1	0	0	0	1	0	1	0
168	1	0	0	0	1	0	0	1	0	1	0
169	0	1	0	0	1	0	0	1	0	1	0
170	0	0	1	0	1	0	0	1	0	1	0
171	0	0	0	1	1	0	0	1	0	1	0
172	1	0	0	0	0	1	0	1	0	1	0
173	0	1	0	0	0	1	0	1	0	1	0
174	0	0	1	0	0	1	0	1	0	1	0
175	0	0	0	1	0	1	0	1	0	1	0
176	0	0	0	0	1	1	0	1	0	1	0
177	1	0	0	0	0	0	1	1	0	1	0
178	0	1	0	0	0	0	1	1	0	1	0
179	0	0	1	0	0	0	1	1	0	1	0
180	0	0	0	1	0	0	1	1	0	1	0
181	0	0	0	0	1	0	1	1	0	1	0
182	0	0	0	0	0	1	1	1	0	1	0
183	1	1	0	0	0	0	0	0	1	1	0
184	1	0	1	0	0	0	0	0	1	1	0
185	0	1	1	0	0	0	0	0	1	1	0
186	1	0	0	1	0	0	0	0	1	1	0
187	0	1	0	1	0	0	0	0	1	1	0
188	0	0	1	1	0	0	0	0	1	1	0
189	1	0	0	0	1	0	0	0	1	1	0
190	0	1	0	0	1	0	0	0	1	1	0
191	0	0	1	0	1	0	0	0	1	1	0
192	0	0	0	1	1	0	0	0	1	1	0
193	1	0	0	0	0	1	0	0	1	1	0
194	0	1	0	0	0	1	0	0	1	1	0
195	0	0	1	0	0	1	0	0	1	1	0
196	0	0	0	1	0	1	0	0	1	1	0
197	0	0	0	0	1	1	0	0	1	1	0

APPENDIX B

PLAYER ID	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
198	1	0	0	0	0	0	1	0	1	1	0
199	0	1	0	0	0	0	1	0	1	1	0
200	0	0	1	0	0	0	1	0	1	1	0
201	0	0	0	1	0	0	1	0	1	1	0
202	0	0	0	0	1	0	1	0	1	1	0
203	0	0	0	0	0	1	1	0	1	1	0
204	1	0	0	0	0	0	0	1	1	1	0
205	0	1	0	0	0	0	0	1	1	1	0
206	0	0	1	0	0	0	0	1	1	1	0
207	0	0	0	1	0	0	0	1	1	1	0
208	0	0	0	0	1	0	0	1	1	1	0
209	0	0	0	0	0	1	0	1	1	1	0
210	0	0	0	0	0	0	1	1	1	1	0
211	1	1	1	0	0	0	0	0	0	0	1
212	1	1	0	1	0	0	0	0	0	0	1
213	1	0	1	1	0	0	0	0	0	0	1
214	0	1	1	1	0	0	0	0	0	0	1
215	1	1	0	0	1	0	0	0	0	0	1
216	1	0	1	0	1	0	0	0	0	0	0
217	0	1	1	0	1	0	0	0	0	0	1
218	1	0	0	1	1	0	0	0	0	0	1
219	0	1	0	1	1	0	0	0	0	0	1
220	0	0	1	1	1	0	0	0	0	0	1
221	1	1	0	0	0	1	0	0	0	0	1
222	1	0	1	0	0	1	0	0	0	0	1
223	0	1	1	0	0	1	0	0	0	0	1
224	1	0	0	1	0	1	0	0	0	0	1
225	0	1	0	1	0	1	0	0	0	0	1
226	0	0	1	1	0	1	0	0	0	0	1
227	1	0	0	0	1	1	0	0	0	0	1
228	0	1	0	0	1	1	0	0	0	0	1
229	0	0	1	0	1	1	0	0	0	0	1
230	0	0	0	1	1	1	0	0	0	0	1
231	1	1	0	0	0	0	1	0	0	0	1
232	1	0	1	0	0	0	1	0	0	0	1
233	0	1	1	0	0	0	1	0	0	0	1
234	1	0	0	1	0	0	1	0	0	0	1
235	0	1	0	1	0	0	1	0	0	0	1
236	0	0	1	1	0	0	1	0	0	0	1
237	1	0	0	0	1	0	1	0	0	0	1
238	0	1	0	0	1	0	1	0	0	0	1
239	0	0	1	0	1	0	1	0	0	0	1
240	0	0	0	1	1	0	1	0	0	0	1
241	1	0	0	0	0	1	1	0	0	0	1
242	0	1	0	0	0	1	1	0	0	0	1
243	0	0	1	0	0	1	1	0	0	0	1
244	0	0	0	1	0	1	1	0	0	0	1
245	0	0	0	0	1	1	1	0	0	0	1
246	1	1	0	0	0	0	0	1	0	0	1
247	1	0	1	0	0	0	0	1	0	0	1

APPENDIX B

PLAYER ID	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
248	0	1	1	0	0	0	0	1	0	0	1
249	1	0	0	1	0	0	0	1	0	0	1
250	0	1	0	1	0	0	0	1	0	0	1
251	0	0	1	1	0	0	0	1	0	0	1
252	1	0	0	0	1	0	0	1	0	0	1
253	0	1	0	0	1	0	0	1	0	0	1
254	0	0	1	0	1	0	0	1	0	0	1
255	0	0	0	1	1	0	0	1	0	0	1
256	1	0	0	0	0	1	0	1	0	0	1
257	0	1	0	0	0	1	0	1	0	0	1
258	0	0	1	0	0	1	0	1	0	0	1
259	0	0	0	1	0	1	0	1	0	0	1
260	0	0	0	0	1	1	0	1	0	0	1
261	1	0	0	0	0	0	1	1	0	0	1
262	0	1	0	0	0	0	1	1	0	0	1
263	0	0	1	0	0	0	1	1	0	0	1
264	0	0	0	1	0	0	1	1	0	0	1
265	0	0	0	0	1	0	1	1	0	0	1
266	0	0	0	0	0	1	1	1	0	0	1
267	1	1	0	0	0	0	0	0	1	0	1
268	1	0	1	0	0	0	0	0	1	0	1
269	0	1	1	0	0	0	0	0	1	0	1
270	1	0	0	1	0	0	0	0	1	0	1
271	0	1	0	1	0	0	0	0	1	0	1
272	0	0	1	1	0	0	0	0	1	0	1
273	1	0	0	0	1	0	0	0	1	0	1
274	0	1	0	0	1	0	0	0	1	0	1
275	0	0	1	0	1	0	0	0	1	0	1
276	0	0	0	1	1	0	0	0	1	0	1
277	1	0	0	0	0	1	0	0	1	0	1
278	0	1	0	0	0	1	0	0	1	0	1
279	0	0	1	0	0	1	0	0	1	0	1
280	0	0	0	1	0	1	0	0	1	0	1
281	0	0	0	0	1	1	0	0	1	0	1
282	1	0	0	0	0	0	1	0	1	0	1
283	0	1	0	0	0	0	1	0	1	0	1
284	0	0	1	0	0	0	1	0	1	0	1
285	0	0	0	1	0	0	1	0	1	0	1
286	0	0	0	0	1	0	1	0	1	0	1
287	0	0	0	0	0	1	1	0	1	0	1
288	1	0	0	0	0	0	0	1	1	0	1
289	0	1	0	0	0	0	0	1	1	0	1
290	0	0	1	0	0	0	0	1	1	0	1
291	0	0	0	1	0	0	0	1	1	0	1
292	0	0	0	0	1	0	0	1	1	0	1
293	0	0	0	0	0	1	0	1	1	0	1
294	0	0	0	0	0	0	1	1	1	0	1
295	1	1	0	0	0	0	0	0	0	1	1
296	1	0	1	0	0	0	0	0	0	1	1
297	0	1	1	0	0	0	0	0	0	1	1

APPENDIX B

PLAYER ID	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
298	1	0	0	1	0	0	0	0	0	1	1
299	0	1	0	1	0	0	0	0	0	1	1
300	0	0	1	1	0	0	0	0	0	1	1
301	1	0	0	0	1	0	0	0	0	1	1
302	0	1	0	0	1	0	0	0	0	1	1
303	0	0	1	0	1	0	0	0	0	1	1
304	0	0	0	1	1	0	0	0	0	1	1
305	1	0	0	0	0	1	0	0	0	1	1
306	0	1	0	0	0	1	0	0	0	1	1
307	0	0	1	0	0	1	0	0	0	1	1
308	0	0	0	1	0	1	0	0	0	1	1
309	0	0	0	0	1	1	0	0	0	1	1
310	1	0	0	0	0	0	1	0	0	1	1
311	0	1	0	0	0	0	1	0	0	1	1
312	0	0	1	0	0	0	1	0	0	1	1
313	0	0	0	1	0	0	1	0	0	1	1
314	0	0	0	0	1	0	1	0	0	1	1
315	0	0	0	0	0	1	1	0	0	1	1
316	1	0	0	0	0	0	0	1	0	1	1
317	0	1	0	0	0	0	0	1	0	1	1
318	0	0	1	0	0	0	0	1	0	1	1
319	0	0	0	1	0	0	0	1	0	1	1
320	0	0	0	0	1	0	0	1	0	1	1
321	0	0	0	0	0	1	0	1	0	1	1
322	0	0	0	0	0	0	1	1	0	1	1
323	1	0	0	0	0	0	0	0	1	1	1
324	0	1	0	0	0	0	0	0	1	1	1
325	0	0	1	0	0	0	0	0	1	1	1
326	0	0	0	1	0	0	0	0	1	1	1
327	0	0	0	0	1	0	0	0	1	1	1
328	0	0	0	0	0	1	0	0	1	1	1
329	0	0	0	0	0	0	1	0	1	1	1
330	0	0	0	0	0	0	0	1	1	1	1
END											

APPENDIX C

APPENDIX C: MCC CODE PID/AMMO TYPE PARTITION

TABLE C1: MCC CODE PID/AMMO TYPE PARTITION

Serial Number	CODE PREFIX (HEXA-DECIMAL) "YZ"	CODE PREFIX (BINARY)	AMMO TYPE (BLUEFOR)	BLUEFORCE PLAYER ID (EVEN ONLY)	OPFOR PLAYER ID (ODD ONLY)	AMMO TYPE (OPFOR)
0	00	0000 0000	AMMO A	002 - 330	001 - 329	AMMO E
1	10	0001 0000		332 - 660	331 - 659	
2	20	0010 0000		662 - 990	661 - 989	
3	30	0011 0000		992 - 1320	991 - 1319	
4	04	0000 0100		1322 - 1650	1321 - 1649	
5	05	0000 0101		1652 - 1980	1651 - 1979	
6	06	0000 0110		1982 - 2310	1981 - 2309	
7	01	0000 0001		2312 - 2640	2311 - 2639	
8	02	0000 0010		2642 - 2970	2641 - 2969	
9	03	0000 0011		2972 - 3300	2971 - 3299	
0	40	0100 0000	AMMO B	002 - 330	001 - 329	AMMO F
1	50	0101 0000		332 - 660	331 - 659	
2	60	0110 0000		662 - 990	661 - 989	
3	70	0111 0000		992 - 1320	991 - 1319	
4	0B	0000 1011		1322 - 1650	1321 - 1649	
5	0C	0000 1100		1652 - 1980	1651 - 1979	
6	07	0000 0111		1982 - 2310	1981 - 2309	
7	08	0000 1000		2312 - 2640	2311 - 2639	
8	09	0000 1001		2642 - 2970	2641 - 2969	
9	0A	0000 1010		2972 - 3300	2971 - 3299	
0	80	1000 0000	AMMO C	002 - 330	001 - 329	AMMO G
1	90	1001 0000		332 - 660	331 - 659	
2	A0	1010 0000		662 - 990	661 - 989	
3	B0	1011 0000		992 - 1320	991 - 1319	
4	14	0001 0100		1322 - 1650	1321 - 1649	
5	16	0001 0110		1652 - 1980	1651 - 1979	
6	0D	0000 1101		1982 - 2310	1981 - 2309	
7	0E	0000 1110		2312 - 2640	2311 - 2639	
8	0F	0000 1111		2642 - 2970	2641 - 2969	
9	12	0001 0010		2972 - 3300	2971 - 3299	
0	C0	1100 0000	AMMO D	002 - 330	001 - 329	AMMO H
1	D0	1101 0000		332 - 660	331 - 659	
2	E0	1110 0000		662 - 990	661 - 989	
3	F0	1111 0000		992 - 1320	991 - 1319	
4	21	0010 0001		1322 - 1650	1321 - 1649	
5	24	0010 0100		1652 - 1980	1651 - 1979	
6	18	0001 1000		1982 - 2310	1981 - 2309	
7	1°	0001 1010		2312 - 2640	2311 - 2639	
8	1C	0001 1100		2642 - 2970	2641 - 2969	
9	1E	0001 1110		2972 - 3300	2971 - 3299	

APPENDIX C

Serial Number	CODE PREFIX (HEXA-DECIMAL) "YZ"	CODE PREFIX (BINARY)	AMMO TYPE (BLUEFOR)	BLUEFORCE PLAYER ID (EVEN ONLY)	OPFOR PLAYER ID (ODD ONLY)	AMMO TYPE (OPFOR)
0	25	0010 0101	AMMO I	002 - 330	001 - 329	AMMO M
1	28	0010 1000		332 - 660	331 - 659	
2	29	0010 1001		662 - 990	661 - 989	
3	2C	0010 1100		992 - 1320	991 - 1319	
4	2D	0010 1101		1322 - 1650	1321 - 1649	
5	34	0011 0100		1652 - 1980	1651 - 1979	
6	38	0011 1000		1982 - 2310	1981 - 2309	
7	3C	0011 1100		2312 - 2640	2311 - 2639	
8	41	0100 0001		2642 - 2970	2641 - 2969	
9	42	0100 0010		2972 - 3300	2971 - 3299	
0	43	0100 0011	AMMO J	002 - 330	001 - 329	AMMO N
1	48	0100 1000		332 - 660	331 - 659	
2	49	0100 1001		662 - 990	661 - 989	
3	4A	0100 1010		992 - 1320	991 - 1319	
4	4B	0100 1011		1322 - 1650	1321 - 1649	
5	52	0101 0010		1652 - 1980	1651 - 1979	
6	58	0101 1000		1982 - 2310	1981 - 2309	
7	5A	0101 1010		2312 - 2640	2311 - 2639	
8	61	0110 0001		2642 – 2970	2641 - 2969	
9	68	0110 1000		2972 - 3300	2971 - 3299	
0	69	0110 1001	AMMO K	002 - 330	001 - 329	AMMO O
1	78	0111 1000		332 - 660	331 - 659	
2	81	1000 0001		662 - 990	661 - 989	
3	82	1000 0010		992 - 1320	991 - 1319	
4	83	1000 0011		1322 - 1650	1321 - 1649	
5	84	1000 0100		1652 - 1980	1651 - 1979	
6	85	1000 0101		1982 - 2310	1981 - 2309	
7	86	1000 0110		2312 - 2640	2311 - 2639	
8	87	1000 0111		2642 - 2970	2641 - 2969	
9	92	1001 0010		2972 - 3300	2971 - 3299	
0	94	1001 0100	AMMO L	002 - 330	001 - 329	AMMO P
1	96	1001 0110		332 - 660	331 - 659	
2	A1	1010 0001		662 - 990	661 - 989	
3	A4	1010 0100		992 - 1320	991 - 1319	
4	A5	1010 0101		1322 - 1650	1321 - 1649	
5	B4	1011 0100		1652 - 1980	1651 - 1979	
6	C1	1100 0001		1982 - 2310	1981 - 2309	
7	C2	1100 0010		2312 - 2640	2311 - 2639	
8	C3	1100 0011		2642 - 2970	2641 - 2969	
9	D2	1101 0010		2972 – 3300	2971 – 3299	
	E1	1110 0001	Special Codes	002 - 330	001 - 329	Special Codes

APPENDIX C

TABLE C2: MCC BIN LOCATION FOR PID ACTIVE BITS (LOGIC 1)

AMMO TYPE	HEXA DECIMAL PREFIX	BIN LOCATION FOR FIRST LOGIC 1 BIT	BIN LOCATION FOR SECOND LOGIC 1 BIT	BIN LOCATION FOR THIRD LOGIC 1 BIT	BIN LOCATION FOR FOURTH LOGIC 1 BIT
A&E	00	8	8	8	8
A&E	01	8	8	8	10
A&E	02	8	8	10	8
A&E	03	8	8	10	10
A&E	04	8	10	8	8
A&E	05	8	10	8	10
A&E	06	8	10	10	8
A&E	10	8	8	8	6
A&E	20	8	8	6	8
A&E	30	8	8	6	6
B&F	07	8	10	10	10
B&F	08	10	8	8	8
B&F	09	10	8	8	10
B&F	0A	10	8	10	8
B&F	0B	10	8	10	10
B&F	0C	10	10	8	8
B&F	40	8	6	8	8
B&F	50	8	6	8	6
B&F	60	8	6	6	8
B&F	70	8	6	6	6
C&G	0D	10	10	8	10
C&G	0E	10	10	10	8

APPENDIX C

AMMO TYPE	HEXA DECIMAL PREFIX	BIN LOCATION FOR FIRST LOGIC 1 BIT	BIN LOCATION FOR SECOND LOGIC 1 BIT	BIN LOCATION FOR THIRD LOGIC 1 BIT	BIN LOCATION FOR FOURTH LOGIC 1 BIT
C&G	0F	10	10	10	10
C&G	12	8	8	10	6
C&G	14	8	10	8	6
C&G	16	8	10	10	6
C&G	80	6	8	8	8
C&G	90	6	8	8	6
C&G	A0	6	8	6	8
C&G	B0	6	8	6	6
D&H	18	10	8	8	6
D&H	1A	10	8	10	6
D&H	1C	10	10	8	6
D&H	1E	10	10	10	6
D&H	21	8	10	6	8
D&H	24	8	8	6	10
D&H	C0	6	6	8	8
D&H	D0	6	6	8	6
D&H	E0	6	6	6	8
D&H	F0	6	6	6	6
I&M	25	8	10	6	10
I&M	28	10	8	6	8
I&M	29	10	8	6	10
I&M	2C	10	10	6	8
I&M	2D	10	10	6	10

APPENDIX C

AMMO TYPE	HEXA DECIMAL PREFIX	BIN LOCATION FOR FIRST LOGIC 1 BIT	BIN LOCATION FOR SECOND LOGIC 1 BIT	BIN LOCATION FOR THIRD LOGIC 1 BIT	BIN LOCATION FOR FOURTH LOGIC 1 BIT
I&M	34	8	10	6	6
I&M	38	10	8	6	6
I&M	3C	10	10	6	6
I&M	41	8	6	8	10
I&M	42	8	6	10	8
J&N	43	8	6	10	10
J&N	48	10	6	8	8
J&N	49	10	6	8	10
J&N	4A	10	6	10	8
J&N	4B	10	6	10	10
J&N	52	8	6	10	6
J&N	58	10	6	8	6
J&N	5A	10	6	10	6
J&N	61	8	6	6	10
J&N	68	10	6	6	8
K&O	69	10	6	6	10
K&O	78	10	6	6	6
K&O	81	6	8	8	10
K&O	82	6	8	10	8
K&O	83	6	8	10	10
K&O	84	6	10	8	8
K&O	85	6	10	8	10
K&O	86	6	10	10	8

APPENDIX C

AMMO TYPE	HEXA DECIMAL PREFIX	BIN LOCATION FOR FIRST LOGIC 1 BIT	BIN LOCATION FOR SECOND LOGIC 1 BIT	BIN LOCATION FOR THIRD LOGIC 1 BIT	BIN LOCATION FOR FOURTH LOGIC 1 BIT
K&O	87	6	10	10	10
K&O	92	6	8	10	6
L&P	94	6	10	8	6
L&P	96	6	10	10	6
L&P	A1	6	8	6	10
L&P	A4	6	10	6	8
L&P	A5	6	10	6	10
L&P	B4	6	10	6	6
L&P	C1	6	6	10	8
L&P	C2	6	6	8	10
L&P	C3	6	6	10	10
L&P	D2	6	6	10	6
	E1	6	6	6	10

APPENDIX D: MILES CODE PARAMETERS

TABLE D1: MILES CODE PARAMETERS FOR DIRECT FIRE ROUTINE

MILES Code No.	No. of Heavy Weapon Hit Words (K) /Round	Delay (D1) µs [1]	Light Weapon Hit Code No.	No. of Light Weapon Hit Words (M) /Round	Delay (D2) µs [1]	Heavy Weapon Near Miss Code No..	No. of Heavy Weapon Near Miss Words /Round	Delay (D3) µs [1]	Light Weapon Near Miss Code No.	No. of Light Weapon Near Miss Word /Round
00	16	0	N/A	0	0	N/A	0	0	N/A	0
01	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
04	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
05	4	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
06	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
10	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
11	4	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
12	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
13	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
14	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
15	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
16	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
17	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
18	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
19	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
20	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
21	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
22	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
23	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
24	0	0	24	4	0	N/A	0	1600+/-20	29	128
25	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
26	8	1600+/-20	27	128	1600+/-20	28	128	0	N/A	0
27	0	0	27	4	0	N/A	0	1600+/-20	29	128

[1] Multiples of 124.98µs should be avoided because it is a multiple of Bin #6.

APPENDIX D

TABLE D2: MILES CODE PARAMETERS FOR GUIDED MISSILE ROUTINE

MILES Code No.	Range (meters)	IGS Transmit Time for DA (s)	IGS No. of Messages / sec	FGS Transmit Time for DB (s)	FGS No. of Messages / Sec	Light Weapon Hit Code No.	Delay D1 (ms)	No. of Light Weapon Words	Tracking Interval T(s)	No. of Messages for "Hit" Eval. (GK)
02		TBD	TBD	TBD	TBD	27	121.3	128	TBD	TBD
03		TBD	TBD	TBD	TBD	27	121.3	128	TBD	TBD
07**	1000	2	8	1	16	27	121.3	128	15	22
07**	1200	3	5.33	1	16	27	121.3	128	15	22
07**	1500	3	5.33	2	8	27	121.3	128	15	22
07**	1700	4	4	2	8	27	121.3	128	15	22
07**	2000	5	3.2	2	8	27	121.3	128	15	22
07**	2200	6	2.67	2	8	27	121.3	128	15	22
07**	2400	7	2.29	2	8	27	121.3	128	15	22
07**	2600	8 *	2 *	2*	8 *	27 *	121.3*	128 *	15	22
07**	2800	9	1.78	2	8	27	121.3	128	15	22
07**	3000	10	1.6	2	8	27	121.3	128	15	22
07**	3300	11	1.45	2	8	27	121.3	128	15	22
07**	3500	12	1.33	2	8	27	121.3	128	15	22
07**	3750	13	1.23	2	8	27	121.3	128	15	22
08		4 *	4 *	2 *	8 *	27 *	121.3*	128 *	6 *	22

Note: Each missile message consists of eight (8) missile words.

* BASIC MILES
** Code No. 7: The design shall include a selectable alternate routine with the same specified parameter values for 2600 m (Basic MILES 10 sec time of flight) range IGS and FGS regardless of the actual range.

APPENDIX D

TABLE D3: MILES CODE PARAMETERS FOR FIRE & FORGET MISSILE ROUTINE

MILES Code No.	AMMO TYPE	Delay (D) (ms)	No. of Code 09 Words / Round	Delay (D1) (ms)	Light Weapon Hit Code No.	No. of Light Weapon Hit Words	Delay (D2) (ms)	Heavy Weapon Near Miss Code No	No. of Near Miss Words	Delay Time For A/V Cue (s)	Total Trans mit Time T (s)	No. of Decoded Words (N)	Decoding Window Duration T1 (s)
09	A & E	0 to 167	224	1650	27	16	1650	28	32	10	1	4	2

APPENDIX E: AMMUNITION TYPE PARTITIONING ASSIGNMENT

TABLE E1: AMMUNITION TYPE PARTITIONING ASSIGNMENT

MILES Code	Weapon/Munitions	Ammo Factors							
		A & E	B & F	C & G	D & H	I & M	J & N	K & O	L & P
00	Universal Kill	Universal Kill							
01	Hellfire								
02	Unassigned								
03	AT-3								
04	Unassigned								
05	Unassigned								
06	Unassigned								
07	TOW, AT-5 (Konkurs)	TOW -IIA	TOW-IIB	AT-5	TOW F&F Alternate mode.				
08	Dragon								
09	Fire & Forget Missiles	Javelin	TOW F&F	LOSAT					
10	125 mm	SABOT	HEAT	HE	Cumulative (K)				
11	Claymore, Mine								
12	105 mm	SABOT	HEAT						
13	122 mm ARTY DF								
14	73 mm, 2.75” Rocket, 57 mm								
15	Viper, RPG-7, Carl Gustav, AT-4	Carl Gustav	RPG-7	AT-4	Viper				
16	120 mm	SABOT	HEAT						
17	90 mm	SABOT	HEAT						
18	152 mm, 155 mm								
19	40 mm Grenade	M430	M385	M918	M918				
20	Rockeye, SMAW								
21	30 mm, GAU-8								

APPENDIX E

MILES Code	Weapon/Munitions	Ammo Factors							
		A & E	B & F	C & G	D & H	I & M	J & N	K & O	L & P
22	25 mm, ZSU 23-4	SABOT	HEAT						
23	30mm (NTC HIND-D), Vulcan								
24	Heavy MG (M2, M85)	Vehicle Mounted		Ind. Weapon	Ind. Weapon				
25	Chaparral, SAM								
26	Stinger								
27	Small Arms (M16, M60, Coax)	Vehicle Mounted	Crew Served	Ind. Weapon	Ind. Weapon				
28	Heavy Weapon Miss								
29	Light Weapon Miss	Vehicle Mounted	Crew Served	Ind. Weapon	Ind. Weapon				
30	Resurrect (GND Systems), Reset (Aircraft Systems)								
31	Heavy Spare Miss								
32	RF SAM								
33	SA-14								
34	AAA-2 30mm								
35	Controller Gun Utility Codes	*	*	*	*	*	*	*	*
36	Reset (GND Systems), Resurrect (Aircraft Systems)								
	Boresight (Continuous Transmission)								

* See Appendix F.

APPENDIX F

APPENDIX F: MILES CODE PARAMETERS FOR ADMINISTRATIVE FUNCTIONS

TABLE F1: MILES CODE PARAMETERS FOR ADMINISTRATIVE FUNCTIONS

MILES Code No.	Ammo Type	PID No.	No. of Words (K1)	Function
30	All	All	8	N/A
36	All	All	8	N/A
35	All	See Below	8	See Below

CODE 35 PID USAGE FOR CONTROLLER GUN FUNCTIONS.

The numbers below identify the PIDs associated with Code 35 administrative functions:

TABLE F2: PID NO. FOR MILES CODE 35 FOR AMMO TYPES A AND E

PID	Functions
162	SMAW spotting rifle
1 to 300	SAT Random No. ID, or SAT Checksum data (1-256 only)
301	SAT ‘Weapon Code Setup’ acknowledge
302	SAT ‘On’ acknowledge
303	SAT ‘Off’ acknowledge
304	SAT (spare 1)
305	SAT (spare 2)
306	Surrogate ID request
307	Surrogate AT4 fire
308	Surrogate SMAW fire Anti-Armor
309	Surrogate SMAW fire Bunker Buster
310	Surrogate SMAW fire spotting rifle
311	Surrogate (spare 1)
312	Surrogate (spare 2)
313	Turret Position Sensor Signal
314	Turret Position Sensor battery low
315	Enable Controller mode.

APPENDIX F

PID	Functions
316	Disable Controller mode.
317-330	CIDDS Special Functions
331	Test
661	Time Mark
1000-1011	Month*
1012-1042	Date*
1043-1049	Day of week (Sunday, Monday, etc.)*
1050-1073	Hours after midnight (1050 = midnight)*
1074-1133	Minutes (1074 = 0 minutes)*
1134-1193	Seconds (1134 = 0 seconds)*
1194	Time sync message complete*
2001	Change even PID to odd by subtracting 1 from PID.
2002	Change odd PID to even by adding 1 to PID.
2003	Send domain of vest neuron chip to Controller Device. Used during Controller Device pairing. (Message ID 0x09)(Sub Message ID 0x30)
2004	Extend run-time of vest to 24 hours, beep buzzer once for 100ms
2005	Power off vest and all paired units, beep buzzer once for 100ms. Send power off message (Message ID 0x1B) to other devices.
2006	Report vest real time clock value (Message ID 0x74) to Controller Device.
2007	Clear vest events and rounds related counters, beep buzzer once for 100ms
2049	Change belt number to 1. (Front)
2050	Change belt number to 2. (Right)

* Note: The laser time sync message consists of one PID each of Month, Date, Day of week, Hours after midnight, Minutes, Seconds, and Time sync complete, in that order.

APPENDIX F

PID	Functions
2051	Change belt number to 3. (Rear)
2052	Change belt number to 4. (Left)
2053	Change belt number to 5. (Front-Right)
2054	Change belt number to 6. (Rear-Right)
2055	Change belt number to 7. (Rear-Left)
2056	Change belt number to 8. (Front-Left)
2057	Detector Initialization

TABLE F3: PID NO. FOR MILES CODE 35 FOR AMMO TYPES B AND F

PID	Functions
001	Enable Controller mode.

APPENDIX G

APPENDIX G: MCC ENCODER/DECODER DESIGN NOTES

NOTE 1: Rapid Fire Weapon, Direct Fire Routine (DFR), Encoding Adaptation.

Rapid-fire weapons, such as 50 Cal Machine Gun, fired in the burst mode using blank fire ammunition require an encoding adaptation. This configures the DFR for the specific rapid-fire weapon to adequately simulate its enhanced lethality over single shot lethality expectations. In the adaptation, the encoder will suppress the Near Miss Message portion of the DFR as follows:

1. A special blank round detonation sensor system detects the firing of a blank round by sensing its detonation to generate a detonation event signal. This signal informs the encoder of the detonation event.
2. The first round detonation event signal, in a rapid fire burst, initiates the appropriate DFR sequence for the blank ammunition fired.
3. The second and subsequent detonation event signals, in a given rapid fire burst, each initiates the suppression of the encoding of the Near Miss Message portion of the previous fired round's DFR by truncating it. If a second or subsequent detonation signal occurs before the previous DFR Near Miss Message enters encoding sequence, all of it is suppressed. If the signal occurs during the Near Miss Message encoding sequence, the sequence is truncated from that time on.
4. The second or subsequent detonation event signal instantly initiates the next fired round's DFR. The process repeats until the fire burst is completed with the last round resulting in the encoding of the complete DFR appropriate for the given rapid fire weapon.

NOTE 2: Direct Fire Weapon Lethality Effects Assessment Routine.

When a MILES Decoder successfully decodes two (2) Hit Words within an eight (8) Hit Word transmission time interval, it initiates a Lethality Effects Assessment Routine (LEAR) to assess the lethality effects status of the host target based on the decode incident.

There is a range dependency inherent in this implementation. At close ranges, the Decoder can, with high probability of success, decode four (4) pairs of Hit Words out of a received eight (8) Hit Word sequence. The Decoder will initiate the LEAR four times in this case. At long range, due to the lower probability of a successful reception of the transmitted Hit Word signal by the MILES Target System, the Decoder may successfully decode fewer than four (4) pairs of Hit Words. As a result, the LEAR would likely be initiated less than four times.

Since the LEAR is entered more than once, and with high probability, four (4) times at close range, the actual probability for each execution of the LEAR must be set less than the desired single weapon ammunition engagement close range lethality effect status Kill Probability. (One Kill lethality effect status assessment outcome from the multiple LEAR executions is sufficient to kill the target.) The equation relating the two probabilities is:

$P_k = 1-(1 - P_W)^D$

$P_W=1-(1-P_K)^{1/D}$

Where P_k = Kill Probability given all Hit Words were received and successfully decoded (close range condition).

P_W = Kill Probability given a single pair of Hit Words were received and successfully decoded.

D = Number of executions of the LEAR given perfect reception and decode.

The decoder will initiate the LEAR when any one of the following events occurs:

APPENDIX G

1. Two (2) identical MILES codes with identical PIDs are detected within the appropriate time window.
2. Two (2) identical MILES codes with one valid PID is detected (one code contains a PID that contains an error, not PID 0000) within the appropriate time window. The valid PID is used for the LEAR and display.
3. Two (2) identical MILES codes with no valid PIDs detected (both PIDs contain errors, not PID 0000) within the appropriate time window. PID 0000 is used for the LEAR. PID FFFF is displayed.

P_k for various weapon's lethality status assessment evaluations are listed in the P_k Tables attached. [The exception is for some Manworn and standalone TOW Systems only one word is needed.]

NOTE 3: Lethality Effects Assessment Routine for Missile Weapons.

For Missile Weapons, LEAR is entered using the P_k value corresponding to the Missile Weapon Code in the P_k Table when a Hit is decoded to determine whether the hit caused a kill. The Hit/Kill decision statistics for the Missile Weapons are based upon the weapon and target type involved.

NOTE 4: Multi-Level Lethality Effects Status For Heavy Weapon Hit.

The multi-level lethality effects assessment for will be one of the following categories:

- Catastrophic Kill (Cat_k).
- Firepower Kill (F_k).
- Mobility Kill (M_k).
- Commo Kill (C_k).
- Hit.

LEAR will assess the category for a hit based on the following formula:

$Cat_k = P_k$ x Ammo Factor x Aspect Angle Modifier.

If a Catastrophic Kill is not assessed, then a Firepower Kill assessment is made where $F_k = Cat_k$ x Fp_k Factor.

If a Firepower Kill is not assessed, then a Mobility Kill is assessed where $Mk = Cat_k$ x Mob_k Factor.

If a Mobility kill is not assessed, then a Commo kill shall be assessed as $Ck = Cat_k$ x Com_k Factor.

If a Commo kill is not assessed, then a Hit is assessed.

The value of Ammo Factor is based on the lethality of the particular ammunition. The MCC will allow a total of eight (8) Ammo Factors. The exact values for the additional four Ammo factors (#5, #6, #7 & #8) will be specified as additional ammunition are included.